INTERPERSONAL APPRAISAL BIASES AND AMBULATORY BLOOD PRESSURE IN MARRIED COUPLES

by

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STATEMENT OF DISSERTATION APPROVAL

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ABSTRACT

This study aimed to examine ambulatory blood pressure (ABP) differences between men and women who make larger appraisal biases of their spouse using the dimensions of the interpersonal circumplex (IPC), and to observe whether these differences depend or are attenuated based on whether the ABP readings took place during a stressor, with the spouse, or others. Appraisal biases have been associated with individual differences in negative affect, but few studies have examined the relationship between appraisal biases on the IPC and blood pressure during normal daily activities. A sample of 263 middle aged and older married couples who were part of a larger study were asked to fill out a questionnaire that included demographic information, as well as participate in a laboratory conflict task with their spouse and then rate how controlling, hostile, friendly, and submissive they viewed their spouse. These interactions were also coded by objective observers, and the discrepancy calculated the bias. The participants underwent simultaneous 1-day monitoring of ambulatory BP, at the same time keeping a diary that included a number of situational variables. Significant linear results were present for systolic blood pressure differences for those who make controlling appraisal biases and curvilinear effects for both systolic and diastolic blood pressure for those who make hostile appraisal biases. These results suggest that both dimensions of social behavior on the IPC demonstrate association with ABP, demonstrating the IPC's usefulness as an

integrative framework to understand psychological factor that confers risk for coronary heart disease. The causal relationship is not understood.

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Table

INTRODUCTION

A growing body of research suggests that personality traits have an important impact on physical health. The evidence is strongest for individual differences in the tendency to experience emotional distress (i.e., negative affectivity/neuroticism), conscientiousness, anger/hostility and related traits, and optimism (Smith and MacKenzie, 2006). Models of mechanisms underlying these associations have emphasized physiological effects of stress and exposure to stressors.

Whereas traditional trait perspectives focus on personality as characteristics people "have" the social-cognitive and interpersonal perspectives approach personality as specific things that people "do" (Cantor, 1990). This study incorporates both the social-cognitive and interpersonal perspectives in examining the personality related predictors of ambulatory blood pressure in middle aged and older married couples. Specifically, we examine the association of appraisal biases of your spouse based on the interpersonal circumplex dimensions and the association to ambulatory blood pressure.

Social and cognitive factors related to personality

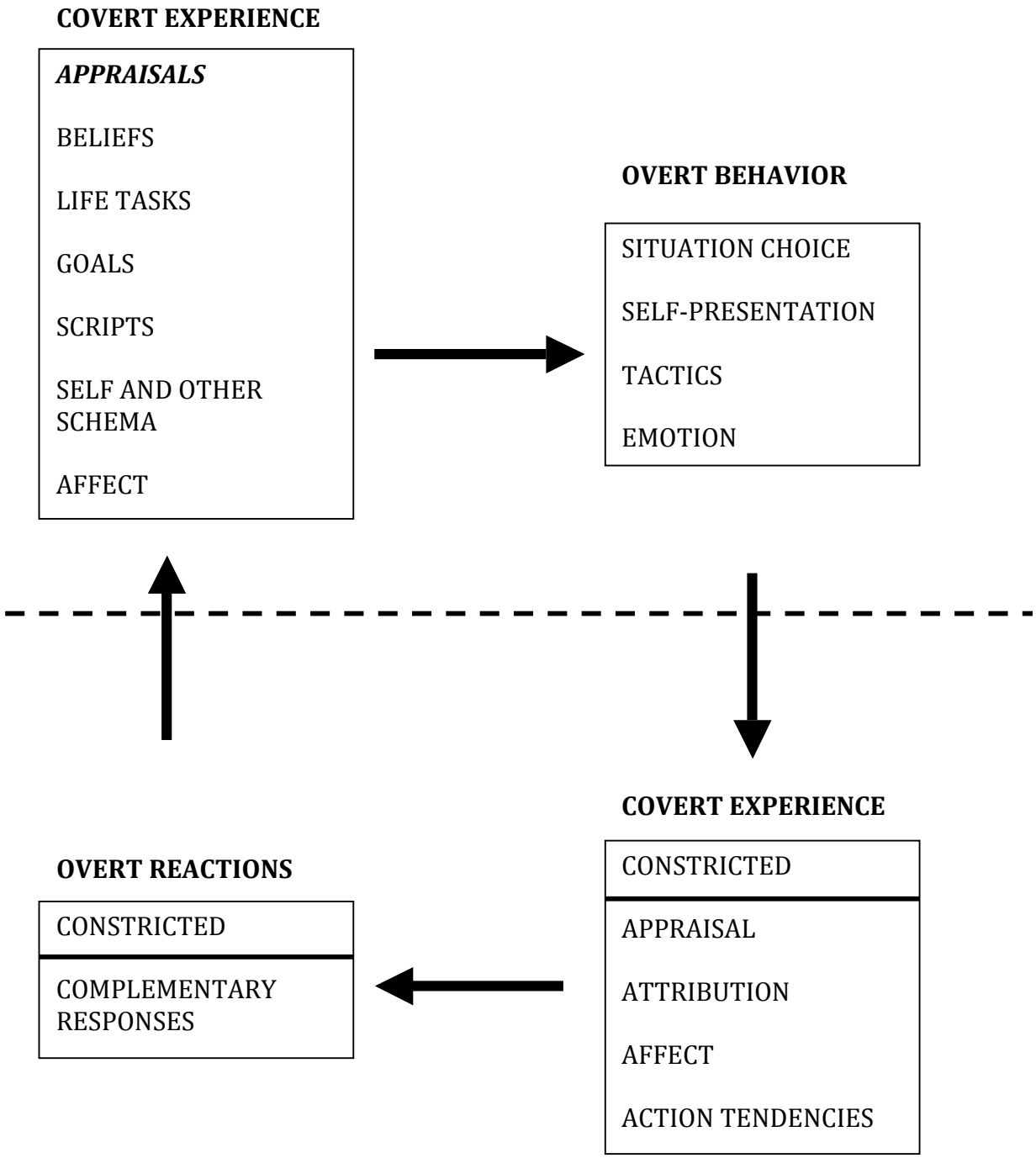
Compared to trait constructs such as neuroticism/negative affectivity, social-cognitive personality constructs, such as appraisal, interpretation, or encoding of situations and other people, provide a more active and specific account of individual differences health (Smith and MacKenzie, 2006). As such, social-cognitive constructs are

likely to prove useful in explicating the mechanisms through which personality characteristics influence health.

Furthermore, personality risk factors are consistently associated with social-environmental risk factors, such as low social support and high job stress. Personality traits influence exposure to health-relevant social circumstances rather than simply moderate reactions to these separate influences on health (Robins, Caspi, and Moffitt 2002; Smith and MacKenzie, 2006). That is, personality involves processes in which people influence their everyday social experiences. In interpersonal theory, this concept is articulated as the transactional cycle (see Figure 1; Carson, 1969, Kiesler, 1996) where intraindividual factors, such as appraisals, guide overt social behavior. Once expressed, the actor's behavior tends to restrict an interaction partner's experience in such a way that the partner's interpersonal responses are consistent with the actor's original expectancies, affect, or beliefs. The resulting stability of the reciprocal interaction patterns contributes to the apparent stability of both personality and aspects of the social environment (Caspi, Bem, and Elder 1989; Smith and Spiro, 2002, Wagner, Kiesler, and Schmidt, 1995).

In interpersonal theory, as in social cognitive models, appraisals or construals of other people play a key role in understanding personality. The interpersonal approach describes social behavior as varying along two basic dimensions forming a structural model of interpersonal behavior—the interpersonal circumplex (IPC; see Figure 2; Kiesler, 1983; Wiggins, 1979). The affiliation dimension contrasts hostility and quarrelsomeness with warmth and friendliness. The dominance dimension contrasts behavior related to exerting dominance and control over others and achieving status, with submissiveness and passivity (Pincus and Ansell, 2003). The circumplex can be used

INDIVIDUAL



OTHERS IN THE SOCIAL ENVIRONMENT

Figure 1
The Transactional Cycle in Interpersonal Theory

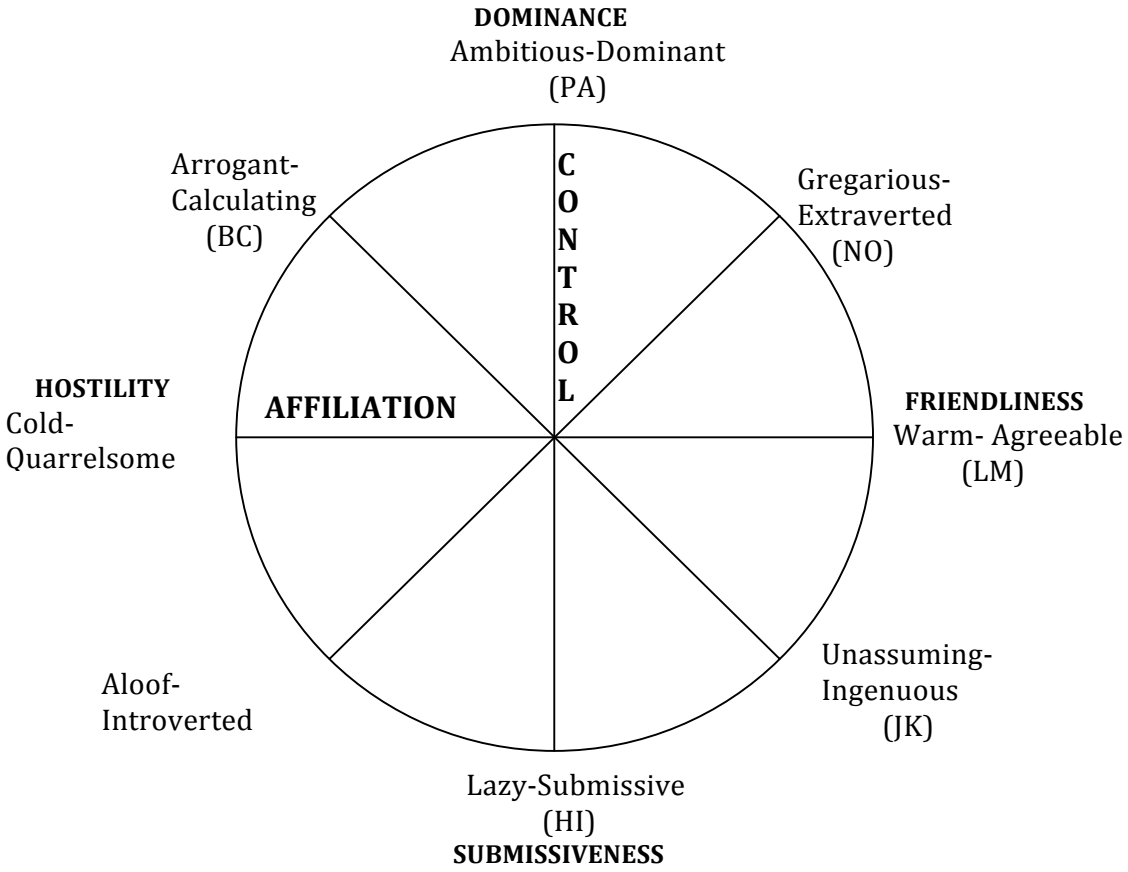


Figure 2
The Interpersonal Circumplex

equally well to describe personality and aspects of the social environment and in this way provides common concepts and methods for integrating personality and social–environmental risk factors (Gallo and Smith, 1999) and for examining psychophysiological mechanisms underlying their association with health (Smith, Gallo, and Ruiz, 2003). Personality measures associated with both axes in the interpersonal circumplex confer coronary risk (Smith, Ruiz, and Uchino, 2004). For example, socially dominant interaction styles (e.g., emphatic speech, talking "over" others) independently predicted subsequent coronary heart disease (CHD; Houston, Chesnery, Black, Cates, and

Hecker, 1992), while self-reports of dominance were related to incident CHD (Siegman, Townsend, Civelek, and Blumenthal, 2000).

Prior research on appraisal biases

Cognitive models of negative emotion emphasize appraisals or interpretations of events as key influences on adjustment. Lazarus and colleagues (Lazarus and Folkman, 1984; Lazarus, Lazarus, and Fay, 1993) suggested that anxiety arises from appraisals of ambiguous danger or threat, depression from appraisals of irrevocable loss and helplessness, and anger from appraisals of offense perpetrated by others. A large body of research supports these general cognitive models (for reviews, see Cisler, Bacon, and Williams, 2007; Dozois, Frewen, and Covin, 2005; Matthews and MacLeod, 2005). For example, depressed and anxious individuals interpret events in expected ways and selectively process information that is consistent with their underlying depressive or anxious schemas (Barrett, Rapee, Dadds, and Ryan, 1996; Chen, Lewin, and Craske, 1996; Heimberg, Vermilyea, and Dodge, 1987). Similarly, aggressive children interpret their peer's actions as hostile (Crick and Dodge, 1996), and hostile persons display enhanced recall of negative information about interaction partners (Allred and Smith, 1991). Hence, the cognitive structures, content, operations, and products identified by cognitive models of negative affect have received considerable empirical support (Ingram, 2003; Ingram, Miranda, and Segal, 1998) and emphasize the potential linear effects of biased appraisals affecting your blood pressure.

Individual differences in negative affect both shape and are shaped by social environments (Caspi, 2000; Mischel and Shoda, 1995; Snyder, 1983), especially in the

context of close relationships (Cooper, 2002). For example, depressive disorders and symptoms are associated with marital distress (Whisman, 2001; Whisman, Sheldon, and Goering, 2000), as are generalized anxiety disorder, phobia, and panic disorder (McLeod, 1994; Whisman, 2007; Whisman, Sheldon, and Georing, 2000). Individual differences in anger and hostility are also associated with marital strain and dissatisfaction (Baron, Smith, Butner, Nealey-Moore, Hawkins, and Uchino, 2007; Newton and Kiecolt-Glaser, 1995; Rogge, Bradburry, Hahlweg, Engl, and Thurmaier, 2006). If cognitive processes are key influences on negative affectivity, these processes should be apparent in established relationships. Hence, interpretations or appraisals of the spouse's behavior during marital interactions are a potentially important—yet understudied— cognitive feature of negative affective characteristics.

Given the associations between relationships and physical health (Berkman, Glass, Brissette, and Seeman, 2000; Cohen, 2004), understanding specific aspects of relationships, such as the ways partner appraise and view each other and their behaviors, may help clarify these health-relevant relationship processes. Studies have argued that accuracy of the trait knowledge and attitudes about one's spouse or the similarity between spouses' views may be related to relationship quality and duration (Neff and Kamey, 2005; Sanbonmatsu, Uchino, and Birmingham, 2011; Swan, De La Ronde, and Hixon, 1994). Thus, accuracy of appraisals of spouse behavior, as opposed to under or over reporting friendly, hostile, or controlling behaviors, may be better predictors of health outcomes. This emphasizes the potential of a curvilinear effect for the relationship between appraisals and ambulatory blood pressure.

Prior study

Recently, we examined the associations between individual differences in overall negative affectivity and appraisal biases during a laboratory-based marital conflict discussion in this same sample (Traupman, Smith, Florsheim, Berg, and Uchino, 2011). We used the interpersonal circumplex to quantify specific appraisal biases, defined as discrepancies between participants' ratings of their spouses' levels of hostility, friendliness, and control during the marital disagreement and independent behavioral coding of these interactions, as when a participant appraised the spouse as more controlling than was apparent to the raters. Composite negative affectivity was associated with appraisals of the spouse as displaying more control, less friendliness, and more hostility than was evident in independent ratings. Hence, the broad trait of negative affectivity was associated with maladaptive appraisal biases. The results identify appraisal as a useful intervention target in efforts to reduce maladaptive effects of negative affectivity and its components, which have been associated with cardiac risk.

Personality and cardiovascular risk factors

Much research has supported the idea that personality factors may contribute to enduring increases in blood pressure through stress-related physiological reactivity and recovery (for review see Chida and Haner, 2008; Schum, Jorgensen, Verhaeghen, Sauro, and Thibodeau, 2003). However, the mechanisms through which these personality factors influence CVR are not well understood.

Although there has been research on how psychosocial variables such as personality (e.g., Porter, Stone, and Schwartz, 1999; Raikkonen, Matthews, Flory,

Owens, and Gump, 1999) and mood (e.g., Gellman, et al., 1990; Kamarck, et al., 1998) may influence ambulatory blood pressure, very little attention has been paid to whether social constructs or characteristics of social relationships predict ambulatory BP (Uchino, Berg, Smith, Pearce, and Skinner, 1996).

Current study

The current study extends this research by testing the association between the social-cognitive construct of appraisal bias and ambulatory blood pressure. We examined whether appraisal biases of your spouse during a conflict task are associated with ambulatory blood pressure. Understanding the links between appraisals and blood pressure during daily life is important because ambulatory blood pressure (ABP) is a strong predictor of adverse cardiovascular outcomes (Pickering, Harshfield, Devereux, and Laragh, 1983). ABP assessments appear to more closely characterize an individual's blood pressure because a number of representative measurements are taken during everyday life, capturing important fluctuations (see Stone and Shiffman, 1994), and provides researchers with more externally valid evidence regarding an individual's overall blood pressure than that obtained in the laboratory (Pickering, Alpert, DeSwiet, Harshfield, O'Brien, and Shennan, 1994).

Specifically, we tested the association of appraisal biases and average ABP and ABP as a function of events in the course of the day. That is, we first explored whether people with certain tendencies to view their spouse are more controlling, hostile, or friendly than objective coders have elevated average ABP (linear main effect) or if appraising spouse behavior accurately was associated with ABP (curvilinear main effect).

Secondly, using information from the diaries completed after each BP reading, we tested the effects of a number of demographic and stress related variables. Specifically, we explored if appraisal biases predicts higher ABP when in nonsocial situations, social situation not involving with spouse, and social interaction involving the spouse, as well as when in a daily hassle or not.

We predicted that biased appraisals, specifically appraising the spouse as less friendly and more hostile and controlling than is evident to objective observers, would be associated with higher average ambulatory blood pressure. However, given the literature on attitude and knowledge accuracy of one's spouse, we predicted that accuracy of spouse behaviors would be associated with lower ABP if a curvilinear model was associated with ABP. Considering whether the reading took place while interacting with the spouse and/or during a daily stressor was predicted to influence these effects though it was not clear if this would attenuate the potential benefits of interacting with a spouse or increase stress reactivity. We predicted that appraisal biases would only be associated with changes in ABP when interacting with the spouse in a stressful manner (i.e., engaged in a daily hassle/stressor as reported on the diary).

METHOD

Participants

Participants included 263 married couples from the Utah Health and Aging study, which was approved by the University of Utah Institutional Review Board. All participants gave informed consent. Overall, the mean age of wives was 52.89 (SD=10.12) and husbands was 54.94 (SD=10.29), with an average length of marriage of 27.61 years (SD=12.43) and a median household income of $50,000-74,999. The majority of the sample was White (95%), participated in religious activity at least weekly or more (69%), and employed (70%). Participants were recruited from the greater Salt Lake City, Utah community and were paid as part of a larger study on marriage, health, and aging. Screening for eligibility included: (1) married for a minimum of 5 years and (2) at least one member who was between either 40-50 years old or 60-70 years old, and had no more than a 10-year age difference between members. In addition, because of physiological measurements involved in the study, participants could not currently be taking heart or blood pressure medications from a selected list (primarily beta-blockers, calcium blockers, and antianginals). Demographic information on this sample is listed by gender in Table 1, along with descriptive information on the main study variables.

Procedure

The study consisted of three appointments. Husbands and wives attended all three sessions together. During the first session couples individually completed interviews and questionnaires and then participated in two marital interaction tasks, completing the Impact Message Inventory (IMI) immediately after each. The interactions were video-tape recorded for later behavioral coding. The second study sessions began early in the morning on a day when neither member of the couple was working (usually Saturday). The session began with a series of cognitive assessment tasks and the remainder of the session involved instructions on completing the daily diary to accompany ambulatory blood pressure assessment, attachment and adjustment of the ambulatory blood pressure devices (i.e., Accutraker), and collection of a 10-minute resting baseline assessment of blood pressure. The third and final study session included additional physiological measurements.

Measures

Marital conflict task

The Area of Disagreement Questionnaire (ADQ) scale (Gottman, Markman, and Notarius, 1977) contains a list of 13 common topics of marital disagreement (e.g., sex, communication). Participants rated the degree of conflict each topic generates in their marriage by noting how long this has been a topic of disagreement (days, weeks, months) and, when talking about the topic, how much of the time they spend disagreeing with their spouse (0% - 100% of the time). The topic that had the highest combined ratings of

disagreement by husbands and wives was selected for discussion during the marital interaction task.

Appraisal biases of spouse behavior

The Impact Message Inventory (IMI; Schmidt Wagner, and Kiesler, 1999) assesses perceptions of the target individual's behavior on the dimensions of the interpersonal circumplex. In this shorter version of the IMI circumplex (IMI-C; Nealey-Moore, Smith, Uchino, and Hawkins, 2007), participants rate their agreement with a series of 32 statements that indicate how interacting with their spouse made them feel during the task. Participants rate their agreement with each statement on a four-item scale. The items make up four-item octant scales, which in turn are combined in a circumplex weighted formula to obtain scores for warmth, hostility, dominance, and submissiveness. This scale demonstrates good reliability across all dimensions (α = .69 or greater for all scales), and several studies with this version demonstrate construct validity (e.g., Nealey-Moore, Smith, Uchino, and Hawkins, 2007**;** Smith, Ruiz, and Uchino, 2004).

Objective behavior

Videotaped couple interactions were coded using an observational coding scheme based on the Structural Analysis of Social Behavior (SASB; Benjamin, 1974). The SASB coding system has been used in a variety of interactional and marital studies (Benjamin, 1996; Brown and Smith, 1992; Florsheim and Benjamin, 2001). In the current study, we used the SASB-Composite Observational Coding Scheme (SASB-COMP;

Florsheim and Benjamin, 2001). The specific coding steps are: (1) the coder watches the video-taped interaction in 1-minute intervals, focusing on one member of the dyad at a time; (2) the coder tallies specific SASB codes and tallies are converted into frequency scores; and (3) the coder calculates a "composite" score based on the frequency of each SASB code. Frequencies of codes were recorded during the first 6-minute unstructured conflict discussion. Frequencies were recorded for husbands and wives separately, and proportions of behavioral codes were calculated.

It is important to note that as used in this study, the SASB ratings are highly reliable and valid (see Henry, Berg, Smith, and Florsheim, 2007; Smith, et al., 2009). Videotaped discussion tasks were rated by two coding teams consisting of coders who had received a minimum of 75 hours of training in the original SASB system and an additional 20 hours of training with SASB-COMP. Twenty percent of the interaction tapes were randomly selected for reliability coding and coders were blind to which tapes were reliability coded. Average interrater reliability for SASB-COMP (assessed by intraclass correlation) for Wives was .88, and .89 for Husbands. Similar to the IMI, warmth, hostility, dominance, and submissiveness scores were formed, corresponding to the IPC, by weighting the relevant SASB codes.

Ambulatory blood pressure

The Accutracker II (Suntech Medical Instruments, Raleigh, NC) was used to estimate ambulatory systolic (SBP) and diastolic (DBP) blood pressure. The Accutraker II was designed specifically for ambulatory assessments and is well-validated as readings correspond with intraarterial BP assessments during rest, isometric exercise, and bicycle

exercise (White, Lund-Johansen, and Omvik, 1990). As part of the larger study protocol, participants completed a one day ABP assessment. Each participant wore an ABP monitor on a nonwork day and were instructed to fill out a diary sheet immediately following each BP assessment. The ABP monitor was set to take a random reading once every 45 minutes during a 8 to 9 hour ambulatory assessment. See Uchino et al. (2006) for results using portions of this data set for daily stress and cardiovascular reactivity.

The Accutraker II used to measure the ABP utilizes a number of codes that may signify problems with the estimation of ABP. Based on prior research (see Kamarck et al., 1998), we deleted readings associated with test codes 2 (weak Korotkoff sounds), 3 (microphone difficulties), and 4 (air leaks). Outliers associated with artifactual readings will also be identified using the criteria by Marler, Jacobs, Lehoczky, and Shapiro (1988). Comparable to prior research, 15-20% of the ambulatory BP readings needed to be deleted or modified (e.g., Holt-Lunstad, Uchino, Smith, Nealey-Moore, and Cerny, 2003).

Ambulatory diaries

Participants were instructed to complete a one-page diary sheet following each ambulatory cardiovascular assessment. Information included: date and time of cuff inflation, basic variables that might influence ABP (see Guyll and Contrada, 1998; Kamarck, et al., 1998) such as posture (*lying down*, *sitting*, *standing*), activity level (1 = *no activity*, 4 = *strenuous activity*), location (*work*, *home*, *other*), talking (*no*, *yes*), temperature (*too cold*, *comfortable*, *too hot*), prior exercise (*no*, *yes*), and prior consumption of nicotine, caffeine, alcohol or a meal (*no*, *yes*), and to rate their positive

and negative affective states adapted from the Pittsburgh diary of ambulatory mood states (Kamarck et al., 1998). The Cronbach's alphas for negative and positive affect were .84 and .66, respectively. Finally, participants were also asked "Would you say that you were dealing with an everyday hassle or problem at this time?" This item constituted the primary measure of daily stress (*no*, *yes*).

Statistical analyses

The primary analyses utilized Proc Mixed (SAS Institute) to test associations among personality features, appraisal biases, diary measures, and daily blood pressure reading. Proc Mixed analyses allow the examination of effects at multiple levels of the data and among dyads, such as married couples. Multilevel modeling was selected because males and females within dyads provided two sets of interdependent or "nested" data. Proc Mixed uses a random regression model to derive parameter estimates both within and across individuals (Singer, 1998). This analytic procedure uses restricted maximum likelihood techniques to estimate random effects and generalized least squares to estimate fixed effects. All factors were treated as fixed, and Proc Mixed treats unexplained variation within individuals as a random factor. Following Campbell and Kashy (2000), we modeled individuals (i.e., husband, wife) within a dyad as a repeated factor using the compound symmetry covariance structure. This model allowed us to examine predictors (e.g., appraisal biases) of ABP, while controlling the dependency within married couples. To illustrate, the equation for the main analyses of appraisal biases on ABP (excluding covariates) was as follows:

$$ABP_{\text{occasion i, person j, Dyad k}} = b_{0jk} + b_{1ijk}X_{\text{bias ijk}} + e_{ijk}$$

where b_{0jk} represents the average ABP intercept for person *j* in dyad *k* as all measures

were centered at their grand mean (see Singer, 1998). The coefficient b_1 represents restricted maximum likelihood estimates of the slopes estimating person *j* in dyad *k*'s ABP measure from interacting with spouse/other during occasion *i*. As recommended (Campbell and Kashy, 2000), we used the Satterthwaite approximation to determine appropriate degrees of freedom. Models examining statistical interactions (e.g., appraisal bias X interacting with spouse) were an extension of the basic model above.

We included the factors of marital quality, daily stressor (i.e., yes or no from diary), social or nonsocial factors, and interacting with spouse (i.e., spouse or other from diary). This model allows us to examine the within-subjects effect of appraisal biases on ABP within the marriage context and within daily stressors while controlling for the dependency within dyads and measurement occasions. In these analyses age was modeled as a continuous variable and we controlled for BMI, posture, activity level, talking, temperature, alcohol/nicotine/caffeine/food intake and gender, which were treated as fixed factors in the model predicting ABP.

RESULTS

Descriptive statistics on the main study variables are provided in Table 1. Consistent with our prior study (Traupman et al., 2011), we calculated "biased appraisals" by the discrepancy between the participant's rating of their spouse on the dimension of the IPC using the IMI, and the objective coders ratings of the same dimensions using SASB coding.[1] In testing the association between the tendency to make biased appraisals of their spouse on three dimensions of the IPC and ABP, we included the significant covariates of ABP as well as demographic variables to provide a test of the independent effects of the main conceptual variables.

We first examined the potential contribution of extraneous factors such as posture that might have to be statistically controlled in the analysis of ABP (Schwartz, Warren, and Pickering, 1994). In these analyses, body mass index (BMI), age, gender, posture (lying–sitting, sitting–standing), activity level, talking, temperature (comfortable—too cold, comfortable—too hot), nicotine use, food consumption, caffeine consumption, and alcohol consumption (*no*, *yes*) were treated as fixed factors in the model predicting ABP (see Holt-Lunstad, Uchino, Smith, Cerny, and Nealey-Moore, 2003). Consistent with

[1] The SASB codes were positively associated with the IMI dimensions of dominance, hostility, and friendliness, but not associated with the domain of submissiveness. Thus, we did not further test any associations using the submissiveness domain.

Table 1.
Sample Characteristics

Variable	*Husbands*	*Wives*
Age		
M	54.94	52.89
SD	10.29	10.12
Household Income distribution %	(Husbands and Wives reported together)	
<$5000		.8
$5000-14999		.4
$15000-24999		3.8
$25000-49999		28.8
$50000-74999		36.5
>$75000		29.6
Ethnicity (% White)	96.2	94.6
Systolic Blood Pressure (sitting)	123.82	117.7
Diastolic Blood Pressure (sitting)	76.45	68.35
BMI		
M	27.99	26.52
SD	4.29	4.82
HDL		
M	45.89	59.80
SD	12.38	16.23
LDL		
M	110.22	108.76
SD	29.61	25.82
Diabetes %		
None	90.1	93.9
Type 2	7.4	3.4
Type 1	.4	0

Table 1 – Continued

Variable	*Husbands*	*Wives*
Smoking %		
Never Smoked	66.9	76.4
Former Smoker	28.8	19.4
Current Smoker	2.7	1.5
Alcohol %		
None	57.6	63.1
Mild	13.6	17.1
Moderate	28.8	19.8
Exercise %		
Sedentary	6.2	6.8
Mild	30.0	26.6
Moderate	30.4	35.0
High	33.1	28.9

prior research, results of this initial model (see Table 2, 3, 4, 5, 6, and 7) revealed that across the three IPC domains (ordered Control, Friendly, Hostile for each), BMI, age, gender, and activity level were independent predictors of higher ambulatory SBP, whereas BMI, age, gender, temperature cold vs. not, and meal consumption independently predicted higher ambulatory DBP. No other variables were significant. These covariates were included in all other analyses.

Main effects for the actor on systolic BP emerged for the control dimension (b = 1.26, p= *.02*). Thus, those with the tendency to inaccurately view their spouse as *more* controlling than coders had higher systolic BP. These results maintained when additional demographic covariates were included, such as household income, marital quality scores on the Locke-Wallace Marital Adjustment Test (MAT), race/ethnicity, and religious participation (see Table 2, 3, 4, 5, 6, and 7), as well as measurements from the time of the reading testing positive affect, whether it was during a social interaction, whether that interaction was with your spouse or someone else, and whether it was during a daily hassle. The effects were eliminated when negative affect experienced at the time of the reading was added into the model (see Appendix A). No linear main effects were significant for actor or partner effects on the friendliness or hostile domains.

Next, we tested the potential curvilinear effects on the different domains for actor effects. On the control dimension (see Table 8 and 9), linear effects remained significant and squared terms were not significant for SBP, and neither were significant for DBP. On the hostile dimension, squared terms were significant (p=*.05*) on DBP and approached significance (p=*.07*) for SBP. Thus, it appears that the hostile domain is better modeled as an arc rather than a linear effect, while the control dimension appears

Table 2.
Actor Effects on Control

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Age	0.231	3.20	0.002
Gender	3.255	2.24	0.026
Household Income	-0.583	-0.76	0.449
BMI	0.828	5.16	<.0001
MAT	0.030	0.98	0.327
Religious Participation	-0.103	-0.20	0.843
Posture-lying/sitting	0.051	0.05	0.957
Posture-sitting/standing	-0.655	-1.18	0.237
Temperature-cold/comf	1.235	1.18	0.239
Temperature-comf/hot	0.673	0.67	0.504
Activity Level	2.399	2.86	0.004
Talking	0.797	1.50	0.132
Nicotine	1.453	0.51	0.613
Alcohol	-3.039	-1.39	0.164
Meal	-0.700	-1.01	0.314
Caffeine	1.564	1.48	0.138
Actor Difference Control	1.259	2.27	0.024
Diastolic Blood Pressure			
Age	0.074	1.80	0.072
Gender	2.246	2.68	0.008
Household Income	0.219	0.49	0.621
BMI	0.330	3.53	0.001
MAT	0.005	0.26	0.796
Religious Participation	-0.299	-1.00	0.316
Posture-lying/sitting	0.436	0.65	0.516
Posture-sitting/standing	0.184	0.47	0.638
Temperature-cold/comf	-1.325	-1.83	0.067
Temperature-comf/hot	-0.770	-1.12	0.265

Table 2 – Continued

Effect	Estimate	*t*	*p*
Activity Level	1.221	2.07	0.038
Talking	0.083	0.22	0.824
Nicotine	-1.491	-0.77	0.439
Alcohol	1.924	1.28	0.200
Meal	-0.999	-2.03	0.042
Caffeine	0.787	1.06	0.290
Actor Difference Control	0.293	0.92	0.359

Note: Where MAT are scores on the Marital Adjustment Test

Table 3.
Partner Effects on Control

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Age	0.245	3.37	0.001
Gender	3.358	2.29	0.023
Household Income	-0.521	-0.67	0.506
BMI	0.805	4.99	<.0001
MAT	0.023	0.77	0.442
Religious Participation	-0.079	-0.15	0.882
Posture-lying/sitting	0.110	0.12	0.908
Posture-sitting/standing	-0.632	-1.14	0.254
Temperature-cold/comf	1.037	0.98	0.326
Temperature-comf/hot	0.601	0.60	0.552
Activity Level	2.412	2.86	0.004
Talking	0.814	1.53	0.126
Nicotine	0.001	0.00	1.000
Alcohol	-3.892	-1.73	0.084
Meal	-0.764	-1.09	0.275
Caffeine	1.380	1.30	0.195
Actor Difference Control	0.255	0.45	0.654
Diastolic Blood Pressure			
Age	0.068	1.63	0.104
Gender	2.242	2.87	0.004
Household Income	0.255	0.57	0.570
BMI	0.311	3.33	0.001
MAT	0.007	0.40	0.690
Religious Participation	-0.325	-1.07	0.284
Posture-lying/sitting	0.561	0.84	0.404
Posture-sitting/standing	0.231	0.59	0.555
Temperature-cold/comf	-1.154	-2.08	0.037
Temperature-comf/hot	-0.836	-1.21	0.228

Table 3 – Continued

Effect	Estimate	*t*	*p*
Activity Level	1.235	2.09	0.036
Talking	0.101	0.27	0.787
Nicotine	-2.426	-1.19	0.236
Alcohol	1.394	0.90	0.369
Meal	-1.072	-2.17	0.030
Caffeine	0.680	0.90	0.366
Actor Difference Control	0.399	1.22	0.223

Note: Where MAT are scores on the Marital Adjustment Test

Table 4.
Actor Effects on Friendliness

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Age	0.255	3.55	0.001
Gender	3.278	2.24	0.025
Household Income	-0.511	-0.66	0.511
BMI	0.816	5.05	<.0001
MAT	0.019	0.61	0.545
Religious Participation	-0.041	-0.08	0.938
Posture-lying/sitting	0.046	0.05	0.962
Posture-sitting/standing	-0.658	-1.19	0.235
Temperature-cold/comf	1.129	1.16	0.245
Temperature-comf/hot	0.674	0.67	0.504
Activity Level	2.402	2.85	0.004
Talking	0.805	1.52	0.129
Nicotine	1.600	0.56	0.578
Alcohol	-3.085	-1.41	0.158
Meal	-0.723	-1.04	0.299
Caffeine	1.580	1.50	0.135
Actor Difference Control	0.088	0.14	0.888
Diastolic Blood Pressure			
Age	0.078	1.91	0.057
Gender	2.231	2.66	0.008
Household Income	0.268	0.60	0.547
BMI	0.324	3.46	0.001
MAT	0.000	0.02	0.985
Religious Participation	-0.279	-0.93	0.351
Posture-lying/sitting	0.429	0.64	0.523
Posture-sitting/standing	0.182	0.46	0.642
Temperature-cold/comf	-1.339	-1.85	0.065
Temperature-comf/hot	-0.769	-1.11	0.265

Table 4 – Continued

Effect	Estimate	*t*	*p*
Activity Level	1.229	2.09	0.037
Talking	0.089	0.24	0.812
Nicotine	-1.448	-0.75	0.452
Alcohol	1.920	1.28	0.201
Meal	-1.007	-2.05	0.040
Caffeine	0.801	1.08	0.282
Actor Difference Control	0.280	0.79	0.432

Note: Where MAT are scores on the Marital Adjustment Test

Table 5.
Partner Effects on Friendliness

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Age	0.253	3.50	0.001
Gender	3.342	2.27	0.023
Household Income	-0.473	-0.61	0.545
BMI	0.805	4.99	<.0001
MAT	0.022	0.71	0.481
Religious Participation	-0.056	-0.11	0.915
Posture-lying/sitting	0.106	0.11	0.911
Posture-sitting/standing	-0.634	-1.14	0.253
Temperature-cold/comf	1.041	0.99	0.324
Temperature-comf/hot	0.602	0.60	0.551
Activity Level	2.408	2.86	0.004
Talking	0.812	1.53	0.126
Nicotine	-0.003	-0.00	0.999
Alcohol	-3.887	-1.73	0.084
Meal	-0.764	-1.09	0.275
Caffeine	1.376	1.29	0.196
Actor Difference Control	0.086	0.14	0.889
Diastolic Blood Pressure			
Age	0.077	1.87	0.063
Gender	2.340	2.83	0.005
Household Income	0.332	0.74	0.458
BMI	0.311	3.32	0.001
MAT	0.004	0.23	0.820
Religious Participation	-0.290	-0.96	0.338
Posture-lying/sitting	0.553	0.82	0.410
Posture-sitting/standing	0.229	0.58	0.559
Temperature-cold/comf	-1.522	-2.08	0.038
Temperature-comf/hot	-0.845	-1.22	0.223

Table 5 – Continued

Effect	Estimate	*t*	*p*
Activity Level	1.226	2.08	0.038
Talking	0.097	0.26	0.797
Nicotine	-2.433	-1.19	0.235
Alcohol	1.412	0.91	0.363
Meal	-1.073	-2.17	0.030
Caffeine	0.673	0.89	0.371
Actor Difference Control	0.163	0.46	0.643

Note: Where MAT are scores on the Marital Adjustment Test

Table 6.
Actor Effects on Hostile

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Age	0.257	3.56	0.001
Gender	3.291	2.25	0.025
Household Income	-0.514	-0.66	0.507
BMI	0.816	5.06	<.0001
MAT	0.018	0.59	0.552
Religious Participation	-0.037	-0.07	0.944
Posture-lying/sitting	0.046	0.05	0.962
Posture-sitting/standing	-0.658	-1.19	0.235
Temperature-cold/comf	1.217	1.16	0.246
Temperature-comf/hot	0.671	0.67	0.506
Activity Level	2.401	2.85	0.004
Talking	0.805	1.52	0.128
Nicotine	1.609	0.56	0.576
Alcohol	-3.083	-1.41	0.158
Meal	-0.725	-1.04	0.298
Caffeine	1.582	1.50	0.134
Actor Difference Control	-0.117	-0.20	0.844
Diastolic Blood Pressure			
Age	0.086	2.10	0.036
Gender	2.276	2.72	0.007
Household Income	0.263	0.59	0.553
BMI	0.323	3.46	0.001
MAT	-0.002	-0.13	0.898
Religious Participation	-0.263	-0.88	0.370
Posture-lying/sitting	0.426	0.63	0.526
Posture-sitting/standing	0.180	0.46	0.645
Temperature-cold/comf	-1.351	-1.87	0.062
Temperature-comf/hot	-0.780	-1.13	0.258

Table 6 – Continued

Effect	Estimate	*t*	*p*
Activity Level	1.231	2.09	0.037
Talking	0.092	0.25	0.806
Nicotine	-1.404	-0.73	0.466
Alcohol	1.944	1.30	0.195
Meal	-1.020	-2.08	0.038
Caffeine	0.822	1.10	0.270
Actor Difference Control	-0.458	1.34	0.180

Note: Where MAT are scores on the Marital Adjustment Test

Table 7.
Partner Effects on Hostile

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Age	0.248	3.42	0.001
Gender	3.362	2.29	0.022
Household Income	-0.517	-0.66	0.507
BMI	0.805	4.99	<.0001
MAT	0.026	0.83	0.405
Religious Participation	-0.068	-0.13	0.898
Posture-lying/sitting	0.116	0.12	0.903
Posture-sitting/standing	-0.630	-1.14	0.256
Temperature-cold/comf	1.038	0.98	0.326
Temperature-comf/hot	0.602	0.60	0.551
Activity Level	2.412	2.86	0.004
Talking	0.813	1.53	0.126
Nicotine	-0.036	-0.01	0.991
Alcohol	-3.887	-1.73	0.084
Meal	-0.762	-1.09	0.276
Caffeine	1.366	1.28	0.200
Actor Difference Control	0.369	0.60	0.547
Diastolic Blood Pressure			
Age	0.072	1.72	0.087
Gender	2.409	2.86	0.005
Household Income	0.272	0.61	0.543
BMI	0.313	3.35	0.001
MAT	0.010	0.55	0.585
Religious Participation	-0.302	-1.00	0.316
Posture-lying/sitting	0.574	0.86	0.393
Posture-sitting/standing	0.236	0.60	0.546
Temperature-cold/comf	-1.524	-2.08	0.037
Temperature-comf/hot	-0.839	-1.21	0.226

Table 7 – Continued

Effect	Estimate	*t*	*p*
Activity Level	1.236	2.10	0.036
Talking	0.099	0.26	0.793
Nicotine	-2.498	-1.22	0.222
Alcohol	1.398	0.90	0.368
Meal	-1.068	-2.16	0.031
Caffeine	0.646	0.86	0.390
Actor Difference Control	0.484	1.37	0.170

Note: Where MAT are scores on the Marital Adjustment Test

Table 8.
Actor Curvilinear Effects for Control and Hostile

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Control			
Linear	1.218	2.19	0.029
Curvilinear	-0.246	-1.08	0.280
Hostile			
Linear	-0.443	-0.71	0.477
Curvilinear	-0.336	-1.80	0.072
Diastolic Blood Pressure			
Control			
Linear	0.263	0.82	0.411
Curvilinear	-0.199	-1.51	0.133
Hostile			
Linear	-0.663	-1.87	0.063
Curvilinear	-0.209	-1.96	0.051

Table 9.
Partner Curvilinear Effects for Control and Hostile

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Control			
Linear	0.266	0.47	0.641
Curvilinear	0.086	0.38	0.705
Hostile			
Linear	0.300	0.48	0.635
Curvilinear	-0.088	-0.44	0.659
Diastolic Blood Pressure			
Control			
Linear	0.374	1.14	0.254
Curvilinear	-0.148	-1.14	0.256
Hostile			
Linear	0.411	-1.12	0.264
Curvilinear	-0.084	-0.72	0.473

to be well modeled in linear terms (see Figure 3 and 4). No squared terms were significant for the partner effects.

We then tested whether these associations might differ as a function of if their BP readings occurred while in a social vs. nonsocial situation, while interacting with their spouse vs. someone else, while experiencing state positive vs. negative affect, or while experiencing a daily hassle or not. On the hostile dimension, interaction effects were nonsignificant for social situation (p> *.2*), positive affect (*p*> .4), negative affect *(p*> .2), daily hassle *(p*> .5), or interacting with their spouse or not (*p*>*.5)*. On the control dimension, interaction effects were nonsignificant for social situation (p> *.8*), positive affect (*p*> .4), negative affect *(p*> .5), or daily hassle *(p*> .8). There was a marginally significant interaction effect (*p=.08)* for those interacting with their spouse and biased appraisals on control dimension, with those with the tendency to have biased appraisal of their spouse as controlling showed modified SBP when they were interacting with their spouse versus when not interacting with their spouse. However, it is important to note that of the 6312 potential data points for interacting with their spouse vs. another individual (12 measurements points for each of the 526 participants), less than 1% of these readings occurred while interacting with someone other than the spouse, and with such few data points consisting of only 44 individuals it is difficult to draw conclusions about this effect.

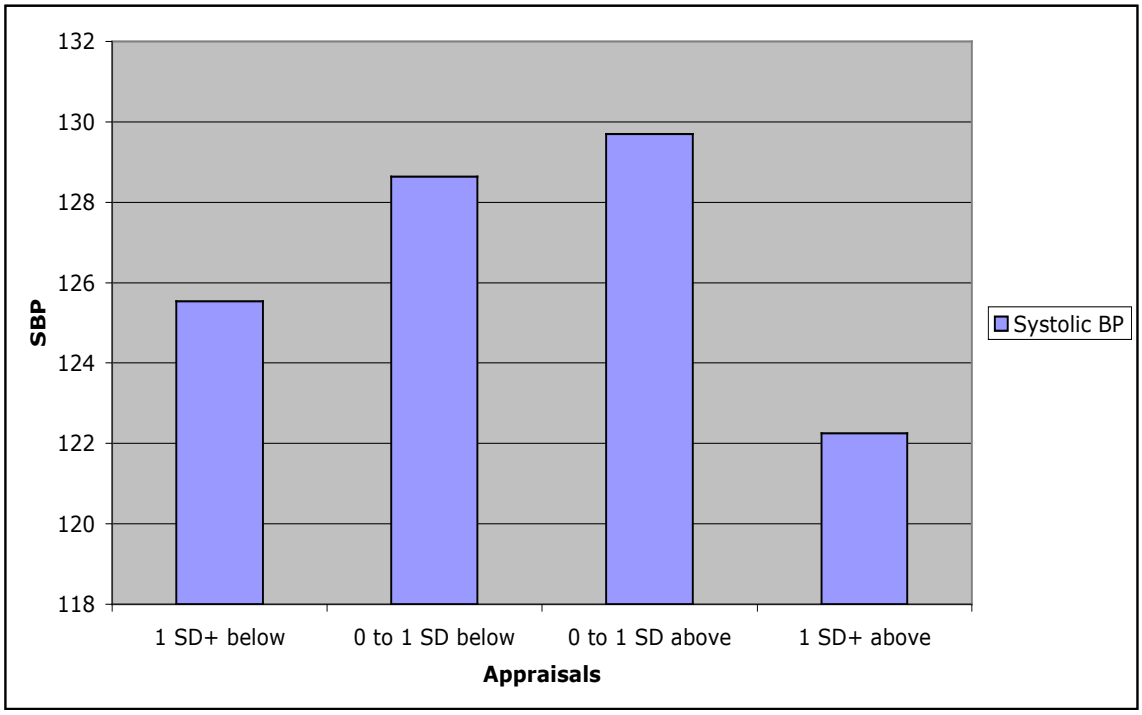


Figure 3
Mean Systolic Blood Pressure by Appraisals on Hostility

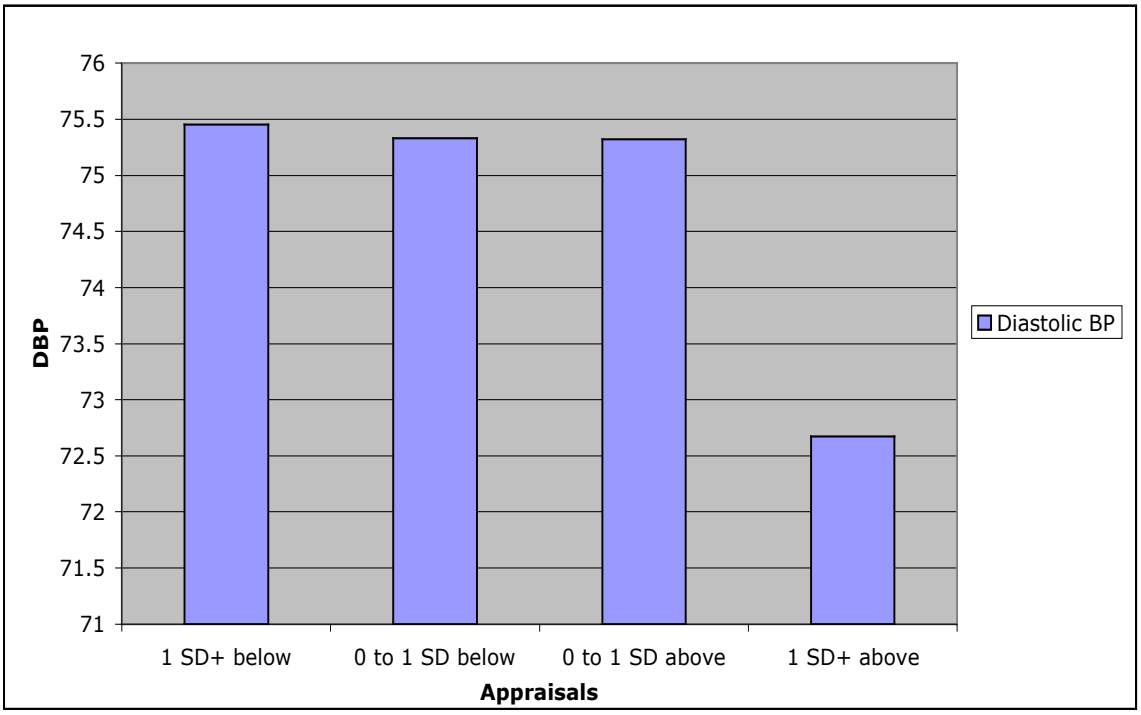


Figure 4
Mean Diastolic Blood Pressure by Appraisals on Hostility

DISCUSSION

Evidence indicates that characteristics of individuals who are married or in long-term partner relationships may affect not only their own health but also the health of their partners (Carmelli, Swan, and Rosenman, 1986; Hibbard and Pope, 1993). In particular, discordant marital relationships have been associated with increased risk of cardiovascular symptoms (e.g., Baker, et al., 2000) and the mechanisms linking CV responses and marital conflict may differ according to patterns of marital communication (Denton, Burleson, Hobbs, Von Stein, and Rodriguez, 2001). More recently, there has been a trend to examine the specific characteristics of the individual and as well as cross-spouse associations with CVD risk factors. Carmeili, Swan, and Rosenman (1986) found that SBP of husbands was positively associated with their wives' preference for planning and order. Wives' SBP, on the other hand, was positively associated with their husbands' dominance. Subsequently, Carmeili, Swan, Hunt, and Williams (1989) reported that wives' perception of workload and social support were positively correlated with their husbands' SBP. Hence, an individual's CVD risk may be influenced not only by his or her own attributes but also by the characteristics of other individuals with whom one frequently interacts, and perhaps others' perceptions of them.

Studying individual factors of appraisals in marriage and ABP is particularly important as separation of personality and social-environmental risk factors could impede development of a more comprehensive understanding of psychosocial influences on CHD. Both hostility and social dominance are consistently associated with social environments that pull for high conflict or evocation of competitiveness in others (Smith et al., 2004), thereby maintaining certain interaction styles. These interpersonal

transactional cycles may provide a better representation of psychosocial risk for CHD than static personality and social-environmental risk factors considered separately (Smith et al., 2004).

In the present study we examined the association between the tendency to make biased appraisals of the spouse on the dimensions of the IPC and the implications for cardiovascular disease. Significant results were found on the IPC domains of control and hostility. No significant results were found on the friendliness or high affiliation domain, and submissiveness was not tested in this sample.[1] Consistent with previous studies, other factors were related to ABP, such as BMI, age, and gender. Specifically, participants who were older, male, had higher BMIs, and were engaging in more vigorous activity levels has higher SBPs, while participants who were male, older, had larger BMIs, were cold at the time of the reading, or were eating at the time of the reading had larger DBPs.

Control dimension

Consistent with the socio-cognitive and reactivity literature, viewing the spouse as more controlling than objective observers was associated with greater increases in ambulatory SBP. This association held after adjusting for time-varying covariates (e.g., posture, activity levels) and demographic factors (e.g., marital satisfaction, income). The independent associations of appraising partners as dominant during social behavior with ABP extend prior evidence regarding these risk factors and support suggestions that the IPC axes confer risk for CHD regardless of the actual behavior (Smith et al., 2003; 2004). Studies of personality, and specifically negative affect and social behavior, play a central role in the evolving understanding of psychosocial influences on CHD (Matthews, 2005).

Dominance has been found to confer CHD risk (Houston et al., 1992; Siegman et al., 2000). Individual differences in dominance and experimentally manipulated expressions of dominant social behavior are associated with increased cardiovascular reactivity (Smith et al., 2003), which in turn is related to increased cardiovascular risk (e.g., Matthews, Zhu, Tucker, and Whooley, 2006).

Additionally, there was a marginally significant effect for appraising their spouse as controlling and interacting with the spouse on SBP. This trend implies that those with the tendency to have biased appraisal of their spouse as controlling showed elevated SBP only when they were interacting with their spouse, while those without or with less of this bias showed comparable SBP regardless of whether they were interacting with their spouse or not. This emphasizes the importance of the deleterious role marriage may have on cardiovascular health for those with certain traits. However, given the small sampling in these data it is difficult to draw conclusions about this effect.

Hostile dimension

Interestingly, significant curvilinear results were noted for the association between the hostile domain on the IPC and greater increases in both ambulatory SBP and DBP. However, we had predicted that accuracy of viewing the spouse's hostile behaviors would be associated with *lower* ABP, when in fact an upside down "J" shape, or being more accurate was associated with *increased* ABP, is a better fit for these data. Previous research has highlighted the role of one's own hostility and aggressiveness, as well as their partner's level of hostility and aggressiveness predicting CHD (Smith, et al., 2004), but this result might signal that underestimating the spouse's level of hostility may

not be protective whereas over appraising hostility might be leading to other regulation effects that cause a drop in BP.

After reviewing plots of the hostility domain, it appears that the over-appraisers, that is, the individuals who appraised their spouse as more hostile than objective coders, appear to be having a stronger influence on this effect, with lower ABP. Overall, it appears that there may be some ceiling and floor effects related to those who make very large over or under appraisals and how they regulate or respond in blood pressure.

In looking to the discrimination literature and blood pressure, Barksdale, Farrug, and Harkness (2009) concluded that speaking up against racism and being able to verbalize and communicate may have prevented elevated BP, and may act as a buffer or protective factors in some manner from the effects of racism. Thus, in this sample, perhaps those who have a tendency to over-appraise hostile behaviors may be prepared and better able to verbalize and communicate their frustration or challenge the hostile behaviors. This emphasizes that the amount of hostility or racism that is experienced is less important as how one may respond, express, or challenge these experiences (Krieger, 1990; Krieger and Sidney, 1996); Peters, 2004).

Additionally, in Lazarus and Folkman's (1984) models of appraisals, stress appraisals are considered under primary appraisals, but are then broken up into threat and/or challenge appraisals. With threat appraisals, the stress is viewed as aversive and there is predicted harm or loss from the situation, and typically the individual experience negative affective states such as fear, anxiety, or anger. Challenge appraisals have a primary focus on the potential for growth from the situation and are often associated with increased motivation and positive affect such as eagerness and excitement. Both threat

and challenge appraisals have been associated with increases in blood pressure, and in particular DBP (Maier, Waldstein, and Synowski, 2003).

In this sample, we were not able to discriminate between whether the tendency to view the spouse inaccurately, whether under or over appraising the hostility, was associated with the idea of threat or challenge. Houston (1992) argued that it is important to measure cognitive appraisal, affect, and motivation to fully understand the role of stress in CVR. For him, he identifies affective and motivational responses as proximal determinants of cardiovascular reactivity, whereas personality and cognitive appraisals have a more distal influence. Thus, it may be that the motivation of the over-reporters is related to seeing the situation with some hostile behaviors as an opportunity for growth.

This difference in types of appraisal may also be related to important underpinnings of CVR, such as cardiac output and total peripheral resistance (Sherwood and Turner, 1995). Blood pressure responses may be vascular, myocardial, or mixed (Manuck, 1994; Sherwood, Dolan, and Light, 1990), and thus different types of appraisals may influence CVR differently, as these are likely to have different significance for cardiovascular disease (Sherwood and Turner, 1995).

Another possibility is that appraisals, by definition, are actually anticipation of events that have not yet transpired (Lazarus and Folkman, 1984) and thus retrospective reporting might miss some of the nuances. Specifically, given the history between these individuals, they may have been brining in other interactions from their history as a more typical level of hostile behaviors. Clearly the interaction between appraisals and blood pressure is quite complex and accuracy of appraisals will need to be examined further.

Limitations, conclusions, and future directions

The present sample was largely White and middle class, and all participants were married. Generalizations to other demographic groups must be made cautiously. The cross-sectional design precludes causal inferences. However, the use of an outwardly healthy sample free from symptomatic CHD reduces the likelihood that associations between appraisal biases and ABP reflect emotional and behavioral responses to disease. The use of ABP allowed for "real world" examination of socio-cognitive associates of ABP without limiting these results to the laboratory, but ABP on one day, and not overnight, may not capture some features of cardiovascular risk through which personality/cognitive factors could influence CHD. Finally, the PROC Mixed HLM analysis used here does not permit calculation of effect sizes.

The effects on both IPC axes were generally independent of SES, race/ethnicity, and marital satisfaction, likely due to little variability in this sample. However, these associations were largely nonsignificant when situation factors documented in the diary associated with each ABP reading were incorporated. Specifically, controlling for positive affect and whether the reading occurred during a social interaction or during a daily hassle, eliminated most of our findings (see Appendix A). Thus, further analyses of how appraisals might be unique to or effected by these factors is warranted. Additionally, appraisals during marital conflict in this study are pending further evaluation. These appraisal biases were based on a single measure of a somewhat artificial argument in the laboratory. Given the duration of most marriages, further examination of whether this tendency to see your spouse as more controlling, hostile, etc. is related to a previous history of controlling or hostile patterns that have emerged in the

relationship or from individual state experiences is warranted, particularly exploring if the laboratory interaction was typical for the couple or not (see Appendix B). Further, it will likely be important to compare appraisals in other relationships, such as friendships or strangers, to better understand the unique aspects of marriage. Finally, given previous established relationship between negative affect and CVR, it may be interesting to look at the direct mediational role appraisal biases have one this relationship (see Appendices C and D).

These limitations notwithstanding, our results illustrate the potential value of studying cognitive and social behavior in clarifying associations of personality with CHD. Using the IPC and studying socio-cognitive factors such as appraisal, offer insight into potentially modifiable psychological mechanisms. Here we further the possibility that behavioral dominance is a distinct phenomenon from hostility (Newton and Bane, 2001) and is its own correlate of CV parameters (Houston, Babyak. Chesney, Black, and Ragland, 1997; Siegman, et al., 2000). This is important as is appears that individual differences in social behavior differ in their correspondence with potentially health-relevant biobehavioral systems. Depue (2006) has argued that the two axes of the IPC correspond closely to neurobiological underpinnings of social behavior. He asserts that dominance reflects the activation and/or responsivity of a dopaminergic incentive or approach motivational system, whereas the affiliation axis reflects variation in an opioid reward system. Hence, the IPC could provide a more specific account of biological underpinnings of psychosocial risk for CHD.

Additionally, studying individual differences in appraisals offer considerable potential to inform the design of risk-reduction efforts, as they could identify specific targets for intervention. Structural models of personality and social behavior can provide general and specific integration of risk. The assessment of both dimensions of the IPC

demonstrated that two dimensions of social behavior or their perceptions—low affiliation (i.e., hostility) and high dominance—are independently associated with ABP. Here we suggest that those that show biased appraisal on the dimensions of control and hostility with their spouse may lead them to respond to a wide range of situation with biases, and thus exaggerated cardiovascular changes. Over time, these exaggerated reactions may place them at greater risk for cardiovascular disease.

APPENDIX A

COVARIATES

In addition to the interaction effects, we also controlled for: whether the reading was when you were with the spouse or not, positive affect at time of reading, if they were engaged in a daily hassle, and if it was a social encounter or not (see tables below).

On the control dimension, the significant association between biased appraisals and systolic blood pressure was eliminated when positive affect experienced while the reading took place (*p= .09),* whether the reading was during a daily hassle (*p=.07*), whether there was a social encounter during the reading (*p=.06*), and if they were interacting with their spouse vs. another individual (*p=.06*) were added to the model individually.

On the hostile dimension, the significant association was eliminated when state positive affect during the reading was added (*p= .14*), whether the reading was during a daily hassle (*p=.08*), whether there was a social interaction or not (*p= .07*), and whether that interaction was with the spouse or someone else (*p= .07*). Thus, it appears that both internal and external factors, such as the current level of positive emotion, daily hassles, and social interactions, are likely to influence BP. The significant partner effect on the hostile dimension was enhanced when the interaction with their spouse vs. others was added to the model (*p= .04*).

Table 10.
Actor Covariates for Linear Effects SBP on Control

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Positive affect			0.002
Actor Control	1.253	2.25	0.025
Negative Affect			0.550
Actor Control	1.276	2.29	0.023
Social Encounter			0.331
Actor Control	1.281	2.30	0.022
With Spouse			0.556
Actor Control	1.296	2.32	0.021
Daily Hassle			0.831
Actor Control	1.261	2.27	0.024

Table 11.
Actor Covariates for Curvilinear Effects SBP and DBP on Hostile

Systolic Blood Pressure			
Effect	Estimate	*t*	*p*
Positive affect			0.002
Actor Hostile Squared	-0.336	-1.75	0.081
Negative Affect			0.502
Actor Hostile Squared	-0.248	-1.31	0.192
Social Encounter			0.355
Actor Hostile Squared	-0.332	-1.78	0.077
With Spouse			0.572
Actor Hostile Squared	-0.321	-1.72	0.086
Daily Hassle			0.792
Actor Hostile Squared	-0.332	-1.78	0.076
Diastolic Blood Pressure			
Positive affect			0.063
Actor Hostile Squared	-0.201	-1.88	0.060
Negative Affect			0.613
Actor Hostile Squared	-0.175	-1.60	0.110
Social Encounter			0.033
Actor Hostile Squared	-0.209	-1.95	0.051
With Spouse			0.630
Actor Hostile Squared	-0.207	-1.93	0.054
Daily Hassle			0.602
Actor Hostile Squared	-0.210	-1.96	0.051

APPENDIX B

CORRELATIONS OF THE IPC OCTANT SCORES ON THE IMI 'IN GENERAL' AND THE IMIM 'POST-CONFLICT TASK'

	General PA	General BC	General DE	General FG	General HI	General JK	General LM	General NO
Conflict PA	.487 **	.238 **	.281 **	.179 **	-.021	-.185 **	-.239 **	.168 **
Conflict BC	.263 **	.388 **	.349 **	.269 **	.058	-.302 **	-.425 **	-.038 **
Conflict DE	.194 **	.332 **	.447 **	.313 **	.065	-.287 **	-.385 **	-.129 **
Conflict FG	.088 *	.260 **	.259 **	.423 **	.265 **	-.136 **	-.228 **	-.152 **
Conflict HI	0.67	.068	.021	.191 **	.454 **	.084	.012	.062
Conflict JK	-.202 **	-.292 **	-.365 **	-.181 **	.080	.568 **	.537 **	.130 **
Conflict LM	-.212 **	-.271 **	-.344 **	-.199 **	.008	.406 **	.526 **	.115 **
Conflict NO	.175 **	.025	-.147 **	-.144 **	.023	.193 **	.140 **	.578 **

Note. ** correlation significant at the .01 level. * correlation significant at the .05 level.

APPENDIX C

TOTAL AFFILIATION AND DOMINANCE

We also tested the association between the total affiliation and dominance IPC axes and ABP for both self and spouse ratings on the NEO-PI-R. All the same control variables and covariate tests were included here.

NEO-PI-R control ratings

For self reports, effects were largely nonsignificant for both SBP actor (*b= -0.18, p= 0.39*) and partner (*b*=-0.03, *p*=0.90) effects as well as DBP actor (*b*=0.04, *p*= 0.76) and partner (*b*=0.06, *p*= 0.62). Similarly, for spouse ratings, effects were largely nonsignificant for both SBP actor (*b*=0.33, *p*=0.14), and partner (*b*=-0.25, *p*=0.26) and DBP actor (*b*=0.20, *p*=0.12) and partner (*b*=-0.00), *p*=0.99). Similar control variables (age, gender, BMI, and activity level for SBP and age, gender, BMI, temperature cold, and meal for DBP) were significant.

NEO-PI-R affiliation ratings

For self reports, effects were largely nonsignificant for both SBP actor (*b*=0.20, *p*= 0.38) and partner (*b*=0.04, *p*=0.86) effects as well as DBP actor (*b*=0.07, *p*=0.62) and partner (*b*=0.13, *p*=.31). Similarly, for spouse ratings, effects were largely nonsignificant

for both SBP actor (*b*=-0.07, *p*= 0.75) and partner (*b*=0.24, *p*=0.26) and DBP actor (*b*=-0.02, *p*=0.84) and partner (*b*=0.07, *p*=0.58). Similar control variables (age, gender, BMI, and activity level for SBP and age, gender, BMI, temperature cold, and meal for DBP) were significant.

Results remained similar whether actor and partner results were included simultaneously or separately, and with the addition of other covariates, such as whether the readings took place during a daily hassle, was a social experience, or was with your spouse or not.

APPENDIX D

MEDIATIONAL ANALYSES

Originally, I hypothesized that (1) appraisal biases will partially mediate associations between trait negative affectivity and blood pressure. Specifically, (1a) for individuals high in anxiety and depressive traits, appraisal biases on the dimensions of hostility and warmth will mediate associations with ABP, such that seeing the spouse as more hostile and less warm than objective measures will be one mechanism through which depression and anxiety affect blood pressure. Similarly, (1b) for anger/hostility, appraisal biases on the dimension of control will partially mediate associations with ABP, again showing that seeing the spouse as more controlling than objective measures indicate will be one mechanism through which anger/hostility leads to increased blood pressure.

Measure

The NEO-PI-R (Costa and McCrae, 1992) is a widely used measure of personality, with well-established reliability and validity. In my masters, the Neuroticism scale was used, with a focus on the facets of anxiety (N1), angry hostility (N2), and depression (N3). Although scores on these scales are elevated among persons with clinically significant emotional disorders, these scales assess individual differences in the

affective traits within the range of normal personality variation as opposed to clinical symptoms or dysfunction (Costa and McCrae, 1992).

Given the overlapping nature of these facets of negative affect (Suls and Bunde, 2005), we used a combined score of N1, N2, and N3, as well as tested these individually. Additionally, both self-reports and spouse ratings on the NEO-PI-R were administered and used in analyses.

Results

We first attempted to replicate prior research showing that personality types characterized by negative affects are associated with higher blood pressure. To test these hypotheses we entered the spouse report of the combined facet of N1, N2, and N3 for the actor and partner main effects while statistically controlling for the extraneous factors (e.g., posture) as well as the basic demographic factors of age, gender, ethnicity, household income, and marital quality.

Consistent with prior research, results of this initial model revealed that BMI ($b = 0.84, p < .001$), age ($b = 0.24, p < .001$), and activity level ($b = 2.20, p = .008$) were independent predictors of higher ambulatory SBP, whereas BMI ($b = 0.30, p = .002$), activity level ($b = 1.20, p = .04$), and meal ($b = -.98, p < .05$) independently predicted higher ambulatory DBP. No other variables were significant.

When testing the spouse ratings on the NEO-PI-R, there were no significant main actor effects in predicting systolic ($p > .4$) or diastolic blood pressure ($p > .2$) as well as partner effects ($p > .04$) for both DBP and SBP. Additionally, no significant actor results were found in predicting systolic ($p > .4$) or diastolic blood pressure ($p > .2$) for self-

reports on the NEO-PI-R as well as partner effects for SBP ($p > .4$), although a partner effect for self reports on DBP neared significance ($p=.06$). Thus, your spouse's self-report of NA was associated with greater increases in your DBP. These results remained the same when actor and partner effects were tested individually and simultaneously. Additional analyses were completed on the individual facets of N1, N2, and N3 for both self and spousal reports, all also of which did not show any significant results for actor effects. One partner effect was significant. On the self-reports of N2, the partner effect was significant for DBP ($p=.008$). Thus, your spouse's self-reported depression was associated with greater increases in your DBP.

Thus, meditational analyses of the role of appraisal biases on this common association could not be tested here, we continued to explore the relationship between the tendency to view your spouse as more controlling, hostile, or friendly than an independent observer and blood pressure, as reported previously.

Other demographic data were also tested to see any other independent associations of interest: religious participation (both SBP and DBP: $p > .4$), whether the reading took place during a social interaction or not (SBP: $p=.09$; DBP: $p=.07$), if that interaction was with your spouse vs. another individual (both SBP and DBP: $p>.2$), or whether the reading took place during a daily hassle (both SBP and DBP: $p>.4$).

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